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Nutrition and Physical Activity Practices in Childcare Centers Versus Family Childcare Homes

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Abstract Obesity rates among preschool-aged children have doubled in the past 10 years, and 60 % of these children spend the majority of their day in childcare facilities. Few studies have examined the quality of nutrition and physical activity practices in childcare centers as compared to family childcare homes. The purpose of this study is to determine if a pattern of differences exist in these two settings. As part of a CDC-funded study to reduce the obesity epidemic in young children, directors of 1,140 childcare facilities (842 out-of-home and 298 in-home) in one large county completed a survey that detailed their practices related to child nutrition and physical activity. Results showed that compared with out-of-home facilities, in-home facilities were more likely to report excellent indoor physical activity (87.2 vs. 85.5 %, $p = 0.059$), less likely to report excellent outdoor physical activity (92.8 vs. 96.5 %, $p = 0.018$), more likely to serve fruit (80.3 vs. 51.2 %), and less likely to serve 1 % milk (45.2 vs. 55 %). This study's present findings revealed that ample opportunity exists to significantly improve the health of young children in both in-home and out-of-home facilities.

Keywords Childhood obesity · Childcare facilities · Preschoolers

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Introduction

Over the past 30 years, the number of overweight and obese children has increased dramatically in the United States making it a serious health concern for children and adolescents. Data from National Health and Nutrition Examination Surveys (NHANES) (1976–1980 and 2003–2006) show that the prevalence of obesity increased from 5.0 to 12.4 % for children aged 2–5 years, from 6.5 to 17.0 % for those 6–11 years old, and from 5.0 to 17.6 % among 12–19 years old. Poor nutrition and physical inactivity (two major lifestyle risk factors for obesity) have to be addressed if obesity trends are to be reversed.

Given that 57 % of preschool children spend the majority of their day in childcare, it is essential to investigate the contributing factors that support or impede positive health practices (Federal Interagency Forum on Child and Family 2007). It has been reported that many children consume 50–100 % of their Recommended Dietary Allowances in a childcare setting (Fox et al. 1997). Therefore, childcare settings provide an opportunity to address the provision of healthy nutrition and healthy lifestyle education. The purpose of this study was to evaluate the nutrition and physical activity practices of childcare environments to determine quality and any needs for improvement.

Because childhood onset obesity tracks strongly into adulthood (Messiah et al. 2011), and because of the potential development of related co-morbidities such as elevated blood pressure and lipids, early childhood obesity prevention efforts should be a priority (National Research Council 2011). Modifiable risk factors for childhood overweight include physical inactivity at age 5 years, increased portion sizes by age 5 years, and increased consumption of sweetened beverages before age 5 years (Robinson 1999; Dennison et al. 2002; Proctor et al. 2003;

Whitaker 2003; Marshall et al. 2004). Previous studies in preschool settings have been successful in targeting these risk factors by increasing child physical activity, reducing television viewing, reducing the consumption of juice (Mo-suwan et al. 1998; Harvey-Berino and Rourke 2003; Fitzgibbon et al. 2002; Stolley et al. 2003; McGarvey et al. 2004; Dennison et al. 2004). In addition, a set of national standards called, *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs*, 3rd Edition (*CFOC3*) have been developed which very clearly delineate the type of nutrition and physical activity patterns that facilities should follow (American Academy of Pediatrics, American Public Health Association, National Resource Center for Health and Safety in Child Care and Early Education 2011b); yet few have studied their impact or have determined the level to which these standards are being upheld.

There are two different environments where childcare is provided and so it is essential to determine current nutrition and physical activity standards within each of these settings. This includes in-home childcare facilities (i.e. family childcare homes) and out-of-home childcare facilities (i.e. childcare centers). In-home childcare facilities in the Miami-Dade community (one of the largest in the nation) are licensed to care for either 6 children or 12 children. Out-of-home childcare centers on the other hand tend to function more like a school with classrooms of typically 20 children of the same age. Childcare centers can range in size from 1 class to upwards of 20 classes. In addition, the regulations for homes and centers often vary. One study examined state regulations compared with menu standards found in Caring for Our Children for childcare centers versus family childcare homes. Benjamin et al.'s (2009) study found:

> For child-care centers, only seven states (14 %) included regulations on all five standards, and 13 states (25 %) had regulations on four of the five menu standards. Ten states (20 %) did not have any regulations on the five menu standards. For family child-care homes, only three states (6 %) had regulations on all five menu standards; four states (8 %) had regulations on four of the five menu standards. Twenty-seven states (53 %) did not have any regulations on the five standards for menus. Within the same state, regulations for child-care facilities and family child-care homes often did not match (p. 1).

There have been some studies that have examined the nutritional quality of out-of-home childcare centers. One study conducted in 92 childcare centers found that the facilities exceeded mean fat levels by over 10 %, and the mean amounts of energy and nutrients were significantly lower than what is expected in the Child and Adult Food Care program (Oakley et al. 1995). A more recent study conducted in North Carolina in 20 childcare centers found that for children ages two to five, 50 % of milk consumed was whole milk and 75 % of the meat consumed was of the high-fat or fried variety (Ball et al. 2008). Regarding physical activity, one study found that when examining other factors like, gender and birth weight, the childcare center was identified as a strong determinant of physical activity among the children studied; it explained 46 % of the variation in activity. The authors concluded that the daily programming for these facilities may influence physical activity in these children and varies depending upon type of indoor space, supervision, gross motor play equipment, and various aspects of outdoor play area (Finn et al. 2002).

Much less is known about the quality of family childcare homes. One study conducted in Kansas in family childcare homes alone, found areas of concern included infrequent servings of low-fat milk, frequent use of unhealthy foods for celebrations, widespread use of television and videogames, and lack of appropriate indoor spaces for physical activity. However, most providers either met or exceeded childcare food standards related to serving fruit and vegetables (Trost et al. 2009).

The childcare setting provides an excellent opportunity to modify risk factors associated with childhood obesity. Therefore, it is essential to know the current status of nutrition and physical activity in childcare centers and family childcare homes. The purpose of this article is to examine nutrition and physical activity patterns in the childcare environment and to determine if differences exist among the two different settings- out-of-home childcare centers and in-home family childcare facilities. This information will be useful to early childhood educators in developing ways to improve the quality of nutrition behaviors within their facility.

Methods

This study is a cross-sectional analysis of baseline data on nutritional and physical activity practices collected prior to implementation of a psycho-educational intervention. Childcare centers (out-of-home facilities) and family childcare homes (in-home facilities), a total of 1,140, were recruited through the Department of Children and Families and were sampled from diverse neighborhoods in Miami-Dade County. Out-of-home child care facilities ($n = 842$) were defined as facilities not operating within a family home environment and in-home child-care facilities ($n = 298$) were defined by operation within a home environment. Facilities were excluded if they did not serve children in the age range of 3–5 years old. While demographic data on each facility in respect to race and ethnicity is limited to a subset of our sample, the Children's Trust

(2010), found that more than 50 % of children in Miami-Dade County are Hispanic (54 %), approximately 25 % (1 in 4) are Black non-Hispanic, and nearly 20 % are White, non-Hispanic. In addition, there are an estimated 20,000 children served within the childcare population in this community.

Preliminary contact was made with participants from August 2010 to January 2012. Baseline data was collected through the administration of the pre-assessment. Although a post-needs assessment was collected upon completion of the program (no $<$ 45 days after facility has received training), the information presented here is on the baseline data only.

Nutrition and Physical Activity Characteristics

1,140 directors and staff from each facility completed a self-assessment that detailed their practices related to nutrition and physical activity. To measure physical activity practices a Physical Activity Frequency Questionnaire was developed based on physical activity standards from Caring for Our Children National Health and Safety Performance Standards (American Academy of Pediatrics, American Public Health Association, National Resource Center for Health and Safety in Child Care and Early Education 2011a) as well as standards from National Association for the Education of Young Children NAEYC (2007). The Directors were instructed to identify the amount of time children spent in the following activities: outdoor physical activity, indoor physical activity, viewing television, utilizing computers and engagement in health related lessons. Increased levels of outdoor physical activity, indoor physical activity and involvement in health related lessons resulted in high scores, while high levels of time spent viewing television and engaged in screen time were reverse coded.

To evaluate food served within child care facilities a Food Frequency Questionnaire was developed based on a modified version of the Harvard Service Food Frequency Questionnaire (HSFFQ) (Willett et al. 1985). The HSFFQ is a self-administered assessment tool created to assess programs interested in nutrition and health practices. The HSFFQ includes assumed portion sizes and frequency scale for the intake of foods. It was designed for low-income populations and is a 5-minute self-report that captures general information about the nutrition practices of the participant (childcare centers and family childcare homes). The foods on the HSFFQ were compiled from a list of most commonly eaten foods and their average portion sizes for low-income communities (Continuing survey of food intake by individuals 1985). A modified version of this measure was utilized with foods and beverages that were of interest to this study. Childcare facility directors were asked to estimate the frequency of servings for the following food and beverage items; whole milk, 2 % milk, 1 % milk, skim milk, juice, water, fresh fruit, vegetables, fruit cup with syrup, chips, crackers, rolls/bread, cookies, cake, pastries, and ice cream. Serving frequency was then categorized and labeled *excellent, average* or *poor* based upon the directors' reports. Items that promote optimal health (i.e. water, fruits and vegetables) received higher scores with increased serving frequency; while items that are linked to not meeting national standards recommendations (i.e. serving whole milk, juice and cookies) received lower scores with increased serving frequency. Standards related to the use of 1 % milk and serving of juice were rated based on Caring for Our Children Guidelines (American Academy of Pediatrics, American Public Health Association, National Resource Center for Health and Safety in Child Care and Early Education 2011b).

Facility Demographic Characteristics

Facility-level demographics were collected on a subsample of facilities ($N = 114$). The assessment is a 5-minute self-report of child care facility representatives that capture number of children enrolled in facility, gender of children, predominant race of children in facility, and predominant ethnicity of children enrolled in facility. In addition, facilities were asked to report on the number of children who received federally subsidized childcare. In order for a family to receive subsidized child care services, the family must meet specific financial and social eligibility criteria that are determined by federal, state, and local regulations. Demographic information was collected during a follow-up observation with the facility.

Statistical Analysis

Missing data were identified; however, due to the large sample size of the study, all statistical analyses were run with the inclusion of missing data. All analyses were conducted with the Statistical Package for the Social Sciences (SPSS version 18). For the purposes of adjusted multivariable analyses, "primary outcomes" were determined to be those practices for which significant differences were found between facility types in the bivariate analyses ($p < 0.1$). Multivariate, logistic regression was performed to assess the independent effects on each of the primary outcomes of each of the following independent variables: facility type (in-home vs. out-of-home), predominant race (Black vs. non-Black), predominant ethnicity (Hispanic vs. non-Hispanic), and family income zone for the purpose of multivariate analysis. Each facility was categorized into five levels of income based on the average household income of the zip code in which the facility was located. Five income zones were established: white ($25,000 $\leq$10 %), green ($25,000 $<$10.1–20.0 %), yellow ($25,000 $<$20.1–30.0 %), pink

($25,000 <30.1–40.0 %) and red ($25,000 >40 %) by Miami-Dade County in 2007.

Results

A total of 1,140 facility directors completed the needs assessment survey. 73.4 % (842) self-identified as directors of "out-of-home" child-care facilities, and 30.0 % (298) self-identified as directors of "in-home" child-care facilities. In-home facilities provided care to average of 6 children while out-of-home facilities provided care to an average of 62 children. See Table 1 for demographic characteristics of facilities.

Physical activity results revealed that 95.5 % of child care facilities were rated as *excellent* in outdoor play and 86.3 % reported *excellent* levels of indoor play. However, facilities displayed lower initial levels of limiting television viewing and providing health related lessons. 46 % of facilities have reported 30–60 min or more of television every day while at their facility. In addition, almost half (47.2 %) of facilities reported brief (30 min) health lessons one time per month or one time per week, while the Caring For Our Children standard is 90–120 min 5 times per week (American Academy of Pediatrics 2011b). Table 2 provides the mean level of quality of physical activity that is being provided to the children. Thirty percent of facilities reported that children watch 60 min or more of television every day while at their program as well as the majority of facilities are reporting brief (30 min) health lessons one time per month or one time per week. In addition, 87.3 % were rated as poor in serving skim milk, 43.7 % assessed as poor for serving 1 % milk. The majority of facilities have good physical activity practices with 95.5 % rated as excellent in outdoor physical activity and 86.3 % rated as excellent in indoor activity.

Out-of home facilities' reported relatively poorer nutrition practices as compared to physical activity levels at baseline, suggesting that nutrition-focused intervention may be beneficial. For example, 87.3 % rated as poor because of not skim milk, 43.7 % assessed as poor for not serving 1 % milk. Table 3 displays the types of foods being served to the children and if the facilities are meeting good standards before services began.

Among available demographic characteristics, significant differences in family income patterns were detected between in-home and out-of-home facilities. Only one category, the zone with ≤10 % of population earning <$25,000 per year, did not differ by facility type ($p = 0.285$). In-home facilities were more likely to report caring for children who receive a federal subsidy for child care ($p < 0.001$). No differences were detected in director report of predominant family race (Black vs. non-Black, $p = 0.085$) or predominant family ethnicity (Hispanic vs. non-Hispanic ($p = 0.453$).

Table 1 Facility characteristics ($N = 1,140$)

Characteristic	In-home facility	Out-of-home facility	*p*
N (Total)	298	842	–
Mean number of children per facility[a]	6.87	62.43	<0.001
Facility report of child gender[a]			
Mean % male	50 %	52 %	0.723
Facility report of predominant race of enrollment at facilities[a]			
Number of facilities reporting predominantly black enrollment—*N* (%)	2 (8.3 %)	22 (24.4 %)	0.085
Facility report of predominant ethnicity of enrollment at facilities[a]			
Number of facilities reporting predominantly hispanic enrollment—*N* (%)	11 (45.8 %)	49 (54.4 %)	0.453
Facilities' ZIP code where >40 % of household has income <FPL ($25,000)—*N* (%)[b]			
>40 % families *N* (%)	47 (18.1 %)	210 (26.7 %)	<0.001
Dietician report of source of child lunch per facility—*N* (%)[c]			
Prepared by facility	93 (89.4 %)	115 (28.0 %)	0.127
Prepared by outside vendor	11 (10.6 %)	292 (71.2 %)	<0.001
Prepared at home by parent/guardian	0 (0 %)	3 (.7 %)	–

[a] Subset demographic information collected on via report by facility directors ($N = 114$)

[b] (Office of Epidemiology and Disease Control, Miami-Dade County, 2007), by facility's ZIP Code

[c] (Consulting Registered Dietitians 2011), by facility ($N = 144$)

Table 2 Environment (physical activity), by facility type ($N = 1,140$)

Characteristic	In-home facility	Out-of-home facility	p
Total N (%)	298 (100 %)	842 (100 %)	–
Outdoor activity ≥30 min 3 times a week	273 (92.9 %)	792 (96.5 %)	0.022
Indoor activity ≥30 min 3 times a week	254 (87.3 %)	700 (85.9 %)	0.338
Television viewing limited to ≤60 min once a week	113 (39.2 %)	474 (59.5 %)	<0.001
Computer time limited to ≤60 min once a week	186 (63.9 %)	410 (51.8 %)	0.003
Health lessons ≥30 min 3 times a week	171 (58.8 %)	390 (50.5 %)	0.036

Data collected via report of facility director

Table 3 Environment (nutrition), by facility type ($N = 1,140$)

Characteristic	In-home facility	Out-of-home facility	p
Total N (%)	296 (100 %)	814 (100 %)	–
Whole milk limited to ≤2–3 times a day	126 (60.0 %)	379 (56.9 %)	0.480
2 % milk limited to ≤2–3 times a day	117 (52.5 %)	343 (52.3 %)	0.983
1 % milk ≥1 time daily	100 (45.2 %)	374 (55.0 %)	0.015
Skim milk ≥1 time daily	23 (11.0 %)	67 (10.7 %)	0.936
Juice limited to ≤2–3 times a day	25 (10.5 %)	76 (10.7 %)	0.057
Water ≥1 time daily	225 (94.1 %)	669 (94.0 %)	0.703
Fresh fruit ≥1 time daily	196 (80.3 %)	370 (51.2 %)	<0.001
Vegetables ≥1 time daily	198 (81.1 %)	609 (84.8 %)	0.157
Chips limited to ≤2–3 times a month	199 (86.9 %)	625 (88.0 %)	0.609
Crackers limited to ≤2–3 times a month	64 (26.9 %)	144 (20.0 %)	0.583
Rolls/bread ≤2–3 times a month	66 (28.1 %)	134 (18.6 %)	0.001
Cookies limited to ≤2–3 times a month	111 (47.8 %)	267 (38.6 %)	0.072
Cake limited to ≤2–3 times a month	223 (96.1 %)	677 (95.6 %)	0.841
Pastry/doughnuts limited to ≤2–3 times a month	218 (94.0 %)	666 (94.6 %)	0.471

Data collected via report of facility director

Physical Activity

Levels of outdoor activity did differ by facility type, ($p = 0.022$), meaning that outdoor physical activity levels were higher among out-of-home facilities. While levels of indoor activity did not differ by facility type, ($p = 0.338$), indicating that there were no statistical differences in levels of indoor physical activity when comparing in-home-facilities with out-of-home facilities. Notably, the amount of limiting television/video did differ by type of facility with more out of-home facilities rated as *excellent,* 59.2 % compared to 39.7 % of in-home-facilities rated as *excellent,* ($p < 0.001$). Limiting computer time also differed by facility type with in-home-facilities reporting higher levels ($p = 0.003$) than out of-home facilities.

Nutrition

Type of facility significantly impacted quantity of fresh fruit served ($p < 0.001$), family child care homes reported providing significantly more fresh fruit than child care facilities ($p = 0.001$), reported limiting servings of rolls and bread ($p < .001$) as compared to out-of-home childcare facilities. In-home-facilities also indicated better performance on nutrition related lessons; meaning, they provided more lessons with a basis in health and nutrition each week, ($p = .036$).

Multivariate Analyses

Multivariate analyses were conducted to assess whether or not income zone moderated the differences in nutrition and physical activity practices detected between in-home and out-of-home facilities. After including "income zone" in the model, only indoor physical activity, outdoor physical activity, and television-use practices remained significantly different ($p \leq 0.05$) between the two facility types. Associations between facility type and all other nutritional/dietary outcomes (e.g., fresh fruit and vegetable consumption, 1 % milk consumption) were no longer significant ($p > 0.05$), after adjusting for income zone.

Discussion

Because more children are in childcare programs today than ever before, the role of the childcare setting in the battle against obesity has become increasingly important. This large-scale program represents a unique opportunity to compare nutrition and physical activity practices in out-of-home compared to in-home childcare facilities. Our study found that among facilities serving mainly ethnic minority preschool children most are displaying high initial levels of television viewing and low levels of providing health-related lessons. Overall, out-of-home facilities were more likely than in-home facilities to provide healthy physical activities for children (increased indoor and outdoor play, limited television viewing). In-home facilities, by contrast, were more likely than out-of-home facilities to provide healthy nutrition for children (e.g., cooking lessons, routine provision of fresh fruit, and limited use of high-fructose sweeteners); however, these differences appeared to be moderated by differences in neighborhood socioeconomic status.

In any case, the data highlight the potent role that social factors play in determining child exposure to healthy nutritional and physical activity practices. Multivariate regression demonstrated the role of educational setting (out-of-home) in determining exposure to increased physical activity and decreased quality of nutritional environment, but these associations were strongly moderated by neighborhood socioeconomic status. While consistent with prior studies demonstrating the association between family income and health behaviors (Lantz et al. 1998), this study demonstrates that the association is bidirectional and modifiable. While lower socioeconomic status (SES) is generally associated with more sedentary lifestyles (Winkleby et al. 1990), out-of-home child-care facilities may be able to modify the negative influence of SES on outdoor physical activity due to bigger outdoor spaces that allow for more extensive playground equipment than in smaller in-home facilities. Mounting resource limitations, fewer available staff, and poor access to safe, functional playground equipment may further make it difficult for in-home facilities to provide the same quality of outdoor play.

Significant differences were also found in respect to limiting television viewing with out-of home facilities performing at higher levels. Accessibility and staffing challenges likely are contributing factors to this finding with out-of-home facilities faring better due to larger staff size and increased ability to monitor children without the use of video or television. Differences in television viewing may also be related to level of education of staff. In fact, a 2009 (Fees et al. 2009) study found that in-home-facility providers tend to have less schooling and rely upon in-service trainings as a main source of education as opposed to college/university courses. Moreover, 87 % of the in-home-facility providers in their study indicated no teaching license or certification (Fees et al. 2009).

The finding that in-home child care facilities excelled in limiting computer time and providing health lessons is consistent with anecdotal information reported indicating that children receive more positive interaction, more experiences of intentional teaching and more involvement in food preparation in in-home settings compared to out-of home. The paucity of research that explores environmental factors in in-home-facility contexts prevents more solid conclusions to be made; however, the aforementioned are variables that merit further exploration.

Economic resources and use of catering services and participation in government funded food programs may explain differences found in servings of certain nutritional items such as fresh fruit and milk. In-home facilities report more frequent serving of fresh fruit which may be linked to facility-related characteristics such as the fact that since homes are smaller they can purchase smaller amount of fresh items and they do not need to worry about available storage space. In addition, there is less concern over the spoiling of unused fruit that can be left over when having to buy for large out-of-home facilities. These differences were no longer seen when income zone was taken into account, suggesting that the economic climate of the neighborhoods may be a factor in whether or not fresh fruit is served. This is corroborated by the literature which has shown food deserts may be limiting access to fresh fruits in areas of poverty (Frazier et al. 2003; Story et al. 2008).

Although fresh fruit was served at a higher frequency by in-home providers, out-of-home facilities provide more frequent servings of 1 % milk which may be associated with the use of catered food vendors. Catered vendors tend to serve multiple out-of-home facilities and so may have easier means in being able to provide 1 % milk for older children and whole milk for younger children. In-home facilities tend to self-prepare foods and since there are fewer children in their care perhaps they purchase the same type of milk (whole) for all children regardless of age to increase consumption rates and decrease frequency of spoilage.

Limitations

There are some limitations of the current analysis. Because assessment of nutrition and physical activity practices was obtained through self-report it increases the chance for unreliable information. In addition, the sample consisted of low-income multi-ethnic population, therefore inferences were made regarding ethnicities may not be generalized beyond those groups. Lastly, the collection of demographic data was not part of the initial data collection protocol and

so therefore, this information was only able to be obtained for a subset of the population.

Conclusions

Given the significant differences found between family childcare homes and childcare centers across 1,140 facilities, it is important to tailor programs to their unique strengths and weaknesses. Results indicated that in-home childcare homes performed better in respect to the following items: (1) limiting computer time, (2) providing health related lessons, (3) serving fresh fruit, (4) limiting servings of rolls/bread, and (5) limiting servings of fruit in syrup. Out-of-home facilities reported higher ratings in the following items: (1) engaging in outdoor physical activity and (2) limiting television and video time. These differences point to the fact that teachers and professionals working in family childcare homes and childcare facilities can learn from each other, and more attention should be paid to improving quality in these areas. In addition, differences appeared to be moderated by neighborhood socioeconomic status. Therefore, poverty levels and the impact on health disparities continue to hold true for childcare settings and should also be take into account in making sure that programs do not incur any costs when making improvements to quality. For example, substituting juice with water and whole milk with low-fat milk are changes that can be cost effective.

Early childhood is an important period for developing dietary and physical activity behaviors, and practices of child care facilities can improve children's dietary intake, physical activity levels, and energy balance. Childcare facilities and family childcare homes, therefore, can be part of a trans-site intervention in the battle against childhood obesity. Given that millions of children are served annually in these settings, improvements to the diets and physical activity environments can have far reaching impacts.

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